Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D. C. 20554

In the matter of	)	
	)	
	)	
The Development of Operational,	)	WT DOCKET NO. 96-86
Technical, and Spectrum	)	
Requirements for Meeting	)	
Federal, State and Local Public	)	
Safety Agency Communication	)	
Requirements Through the	)	
Year 2010	)	

Comments of the

Minnesota Department of Transportation

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TABLE OF CONTENTS

I. INTRODUCTION

The State of Minnesota with a population of four million covers an area of over 90,000 square miles of varied terrain. The Minneapolis-St. Paul Metropolitan area is a major concentration of population with over 2.5 million. The rest of the population is fairly evenly distributed throughout the state. The economy consists of manufacturing, farming, mining, forest products, tourism and a significant service sector.

State government public safety communications systems are the responsibility of the Minnesota Department of Transportation, (Mn/DOT). Demands are constantly expanding to keep pace with our increased reliance on technology to serve the public. Details of Mn/DOT's applications and designs are described to provide a context for discussions. Mn/DOT recognizes the importance of FCC Docket No. 96-86 and has submitted the following comments.

II. BACKGROUND

A. Overview

Mn/DOT's Office of Electronic Communications (OEC) designs, manages, and maintains communications systems which support all State agencies. The Departments of Public Safety, Transportation, and Natural Resources are primary users of OEC services and the Statewide communications system. This private system includes over 350 communication tower sites and 650 base stations, which support over 9,500 mobile and portable units. The system uses a network of microwave links for the infrastructure to connect these sites to main dispatch locations and department offices throughout the state. The office has 17 statewide locations, 15 of which are radio repair shops, one electronic repair shop, and the central office facility for administration and engineering.

In addition to traditional two-way radio expertise, OEC has also provided other forms of electronic support. Technologies such as Automatic Vehicle Location (AVL), Roadway Weather Information Systems (RWIS), Mobile Data Terminals (MDT's), Global Positioning Systems (GPS), Video monitoring, and Fiber optic networks are some recent additions. OEC also provides internal computer diagnostic and repair services for Mn/DOT.

The mission of the office is "To provide specialized technical, and engineering expertise in electronic communication technologies, by assisting state agencies and local units of government in their delivery of public safety services, management of resources, and performance of daily operations".

OEC has completed State Radio Communications plans for the Emergency Medical Services Regulatory Board and the Fire Chief's Association. OEC has participated in the

organization of state police and Minnesota Incident Management System (MIMS) mutual aid channels.

OEC also provides frequency coordination services to Public Safety and local government agencies within the Midwest region of the United States. We believe that the frequency coordination process ensures efficient utilization of the frequency spectrum, which is a finite natural resource. Frequency coordination activity for APCO, AASHTO, and the FCCA are all performed by Mn/DOT's Office of Electronic Communications.

B. Recent Developments

Mn/DOT is currently involved in a new technology initiative. It will be responsible for overseeing the development, procurement, installation, and ongoing operation and maintenance of a new digital 800 MHZ trunked radio system for the Minneapolis - St. Paul metropolitan area. The system will provide communications interoperability between state, county, city and local public safety providers. The digital trunked radio technology will maximize spectrum efficiency, security, and user flexibility. Shared channels and infrastructure will be utilized for multiple agencies and jurisdictions, making efficient use of resources. Simulcast clusters of transmitters will be used to cover wide areas without using high power transmitters. This will allow greater potential for channel re-use. Wide area users of the 800 MHZ metro radio system include Mn/DOT, State Patrol, Metropolitan Council Transit Operations, Emergency Medical Services, and all State agencies. Local units of government will benefit from enhanced interoperability and extended coverage areas.

There currently is rapid growth in Intelligent Transportation Systems (ITS) applications for public safety. ITS applications use various data to increase safety and efficiency on the roads. Automatic Vehicle Location (AVL) systems are being used in Mn/DOT vehicles and metro area city buses to track their locations from a central dispatch location, providing

improved safety and efficiency of operations. A Road/Weather Information System (RWIS) is being installed throughout the State. This system monitors weather stations along roadsides and provides the data to traffic and maintenance centers for use in planning. Radio channels are often required for acquiring weather data from stations located in remote areas not easily accessible to leased lines or other media.

These and other data acquisition and control applications require radio channels to transmit data to mobile locations. Typically these systems use duplex radio channels to communicate between a central base station and many mobile data radios. In the next five to fifteen years it is expected that such systems will be much more widespread, requiring more spectrum.

III. Discussion of WT DOCKET NO 96-86:

A. INTEROPERABILITY

We support the assertion that the lack of interoperability among public safety systems, which permit units from two or more different agencies or disciplines to exchange information, is one of the most critical deficiencies in today's public safety communications. The conclusion of the FCC is that public safety agencies should operate on contiguous frequencies and use similar or compatible technologies to communicate. To that end, we recommend:

- The FCC support some type of digital equipment standard such as APCO 25.
- The FCC allocate additional spectrum for both mutual aid operations and day-to-day operations.

- The FCC encourage use of multiband equipment for interoperability needs, or allocate separate spectrum for interoperability use.

1. Public Safety Definition

We support the following definitions:

Public Safety: The Public's right, exercised through Federal, State or local government as prescribed by law, to protect and preserve life, property and natural resources and to serve the public welfare.

We believe that the services rendered by or through Federal, State or local government entities in support of public safety duties that do not involve the protection of life and property on a daily basis, but nonetheless are vital functions on which the public depends, are covered by the definition.

Public Safety Services Provider: Governmental and public entities or those non-governmental, private organizations which are properly authorized by the appropriate governmental authority whose primary mission is providing public safety services.

We believe that public safety communication must be established by the government or authorized by the government in order to be directly accountable to the public.

We do not believe in the broad definition of public safety to include utility, pipeline petroleum and railroad communication. However, there should be provisions in the Commission's rules and regulations to allow these types of entities to be authorized for interoperability with public safety communications interoperability as authorized by a government.

We believe that the adoption of the definitions will impact public safety communication in how spectrum will be allocated.

2. "Interoperability" Definition

We also concur with the definitions proposed for interoperability. In particular the distinction between infrastructure-independent, infrastructure-dependent, multi-jurisdictional, and multi-disciplinary are important. These definitions seem to capture the essence of the interoperability issue.

3. Interoperability Needs

The primary mode of interoperability presently needed is for infrastructure-independent multi-jurisdictional communications. The introduction of Intelligent Transportation Systems (ITS), and more intergovernmental partnerships for joint dispatch operations, have increased the amount of multi-disciplinary communications needed. This increased need will continue, but the multi-jurisdictional interoperability need will also remain a key component of interoperability requirements. The day-to-day need for interoperability is by far the most critical component. Agencies are unable to fund or support extensive infrastructure dependant systems to support interoperability. In addition, dispatchers are not able to perform cross-patches fast enough or with the number of different agencies required to satisfy the end public safety providers need. The system gets overwhelmingly complex and cumbersome. The State has relied on multiple scanners in units to provide for interoperability. This will continue to be problematic as our system evolves into the 800 MHZ band. Without manufacturers addressing the need for multi-band radios we will be forced to continue operations with multiple radios in our units.

Addition of spectrum for mutual aid communications will aid in addressing the need for on-scene mutual aid. However this will not address the day-to-day operation interoperability concerns. Public Safety users want to monitor day-to-day activities, in real time, across multiple

agencies. This is currently done via scanning. There is too much delay, and loss of communications, when switching over from agency home channels to mutual aid channels. Also, many agencies do not want to leave their home channels even if this means loss of interoperability.

B. Operational Issues

As referenced in the Docket, the traditional means of communications is over VHF, UHF, and 800 MHZ bands. Car-to-base and car-to-car communications make up the majority of the communications traffic on these systems. Shared use of channels among multi-disciplinary groups has become much more prevalent. We have found, both as users of the spectrum and as frequency coordinators, that the use of paired channels improves sharing and assignment of channels. We recommend that any additional spectrum allocated should be assigned as paired blocks. The need for additional spectrum for public safety users is evident when you consider the types of service and features being proposed for the near future. A list of applications of new technology is included below to identify some of these new applications:

- Statewide Mobile Data
- Automated Field Reporting
- Roadway weather information systems (RWIS)
- Mayday - Statewide (Intelligent Transportation Systems)
- Emergency Management (Hazmat, Stream gauges / Tipping buckets)
- Bureau of Criminal Apprehension (CJIS, NCIC)
- DOT Bridge Monitoring
- Traffic signal controllers (point-to-multi point)

These applications all require spectrum that is currently unavailable. Departments are struggling with providing these advanced features without the means for wide area RF transport capacity or last-mile connectivity.

The docket has identified some of the many high speed data needs of Public Safety agencies. Additional areas to consider are:

DEPARTMENT OF PUBLIC SAFETY:

- 911 CAD (Computer aided dispatch)

  The state patrol is planning a 911 CAD system that would enhance dispatching, fleet management, resource allocation, data archiving and records management for their operation. The system will operate on a network architecture with a master controller located in the metro. Remote dispatch workstations can be located at Patrol Outstate dispatch locations, and at district offices to provide CAD operation off of the main controller. Several levels of access can be provided; from full call taking and dispatching, to read only records reporting.

- Mobile Data System - Statewide

  The State Patrol is planning to implement a statewide mobile data system to support mobile computing terminals. An Automatic Vehicle Location (AVL) system will also require data capacity to provide vehicle and accident location information.

- Automated Field Reporting

  The state patrol is interested in developing an automated field reporting system. The system would automate accident reporting, citation data, and field reports for State Troopers. The system would provide greater data accuracy, timeliness and efficiency.

- NCIC-2000

Large amounts of data will be available to send to station offices, district offices, and to mobile users. Mug shots, criminal wants and warrants, finger prints, criminal records, video evidence, etc.

- On-line Vehicle Inspection

  The State Patrol commercial vehicle inspection section needs real time access to commercial vehicle records. On-line data would enhance inspection efficiency and accuracy. (vehicle records, carrier histories, vehicle records, hauler history, driver histories)

- Data Transfer

  A. Fleet records would be transferred between mobiles, station offices, districts and Central office.

  B. On line manuals, State statutes, and enforcement regulations would be provided to mobiles, patrol station and district offices.

  C. Surveillance video from vehicle would be sent to dispatch and to central office.

DIVISION OF EMERGENCY MANAGEMENT:

- DEM Coordinators

  Regional DEM coordinators are located throughout the state and carry out division of emergency management programs. Data transfer and information exchange with these regional centers will speed up response during emergency recovery operations.

- EAS

  The Emergency Alert System (EAS) is used to provide the public with emergency notification information through local radio and television broadcasters. Originators of emergency alert messages may be State of local authorities as well as national agencies.

BUREAU OF CRIMINAL APPREHENSION

- CJIS / NCIC

  The BCA manages the Criminal Justice Information System (CJIS) and the States connection to the National Criminal Information Center (NCIC). These systems provide criminal record and vehicle information to law enforcement agencies statewide.

The need for these systems will be increasing as law enforcement and public safety agencies are asked to do more with less. As we have seen with our local mobile data system, the system has become a high priority need for the users. Access to information increases the efficiency and safety of the officers. Regional issues are important when considering development of these types of systems. The wide geographic area covered by a state agency makes system and frequency planning critical. Spectrum plans need to be developed, and large amounts of time must be spent on coverage profiles and interference analysis. The key requirement of system development is that of mobile propagation characteristics. Any spectrum allocated for mobile computing or video transmission must have propagation characteristics suited for mobile applications.

The commission should also be aware that the need for high speed data will impact spectrum bandwidth requirements. The recent refarming effort to 12.5 and 6.25 MHZ narrowband technology will provide benefits for digital voice systems, and will increase spectrum use efficiency. However, high speed data applications at 19.2 kbit, and beyond, can not be supported with narrowband spectrum allocations. It is recommended that the commission provided separate wideband spectrum dedicated to high-speed data applications for public safety.

C. Technology Issues

The impact of available and emerging technologies for public safety communications system is of importance to the State. The Commission has started regulatory changes and additions relating to emerging technologies through dockets and Part 90 rules. Docket number 92-235 also referred to as "refarming" provides re-channelization plans, migration to narrowband, and power/antenna height limits. Part 90 rules includes specific language for licensing of trunking systems. Mn/DOT recognizes that emerging technologies will bring about more efficient use of spectrum, and is currently implementing a Metropolitan area 800 MHZ trunking system with digital voice.

The four spectrally efficient technologies currently available for voice and data transmission are: TDMA, FDMA, CDMA, and ACSSB. Mn/DOT is considering TDMA and FDMA technologies for the trunking system.

In the process of designing a large metropolitan area multiple agency trunked system, we have realized that the spectral efficiency of TDMA and FDMA is not the only factor which determines the amount of spectrum that the system will ultimately need. Other interrelated factors which must be considered for a practical public safety system design include: simulcast/multi-site, half-bit error overlap, traffic projections, talk-around, coverage, technology migration, and limited budgets.

In reviewing the different technologies the Commission should not only consider spectral efficiency as the single factor, because spectral efficiency does not necessarily equate to mean system efficiency for a large multiple agency Public Safety communications system.

In addition to the metropolitan area trunking system design, subsystem designs for counties have also been done. The county designs used county allocated NPSPAC channels,

which had stringent coverage requirements along county borders. The adjacent and co-channel county assignments can be as close as two counties away. To engineer this design, sectorized, phase antennas, and antenna down tilts were used to control coverage along county borders. This process definitely increases the reusability of channels in a given geographic area, but leads to the use of more transmitting sites. To cover an entire county along its county lines, multiple transmitting tower sites are needed to control coverage contours, instead of installing a single transmitter in the middle of a county with considerable height and ERP. For a county agency with limited budgets, the additional sites lead to increased infrastructure costs.

An important issue for the Commission to consider is that any Public Safety systems that have been built must last throughout a specified lifetime. New technologies that arrive during this lifetime most likely will not effect the existing systems, unless there is the ability to migrate. Therefore if new technologies are introduced, there should some ability to migrate from existing systems.

D. SPECTRUM ALLOCATION

Mn/DOT supports efforts to maximize efficiency in spectrum use but also recognizes that increased technical efficiency alone will not solve the congestion problems currently faced by Public Safety agencies. We need more spectrum in bands under 1 Ghz.

The Minneapolis-St. Paul metropolitan area 800 MHZ trunked radio system, as described, is an example of the approach where virtually all Public Safety users in an entire region have been accommodated in a single band system. It has the advantages of interoperability, spectral efficiency and economy of scale. The system design has the capacity of over 20,000 subscriber units.

The system has been developed using many of the techniques for achieving spectral efficiency described in the docket;

- Trunked technology
- Simulcast design.
- Directional antennas.
- Frequency coordination using sophisticated modeling techniques.
- Reuse of channels.
- Detailed traffic studies.
- Design assumptions by technical committee of experienced public safety communication personnel.
- Political process at state and local level to pool channels.
- Political process at state and local level to develop technical specifications, along with ownership, operational and funding agreements.

Achieving agreement of the metropolitan agencies and governments through the political process has been and continues to be a monumental task. The process to obtain funding, licensing, and system specifications has involved intense activity of many people for over five years. While this effort has as one of its main objectives, spectral efficiency, we believe that the Commission's regulations have been counterproductive to this goal in two areas:

- Sudden freeze of the 800 MHZ general access pool. The project had identified channels to be used in the design, but could not license them because of the freeze.
- Intercategory sharing of 800 MHZ Public Safety category channels. While in the planning process the Commission licensed a significant block of Public Safety category channels intended for the system to a non-public safety applicant.

These actions by the Commission have been counterproductive to the community planning process which the Commission encourages.

Because government budget approvals typically require more time than the private sector Public Safety cannot compete for channels on a first come first served basis.

The infrastructure design for the region-wide trunking system will also be able to accommodate a future data networking system. This future data networking system being considered may allow for over-the-air access to databases, image processing, finger print matching, and statistics for evaluation. The National Crime Information Center 2000 (NCIC 2000) is a new data networking system which will provide for wireless access to all of the above feature. The Federal Bureau of Investigation is administrating this project, with the Harris Corporation developing the system. The Commission should consider support of this project by any allocation of spectrum needed.

E. Transition

1. Increased use of Commercial Services

Throughout the document the FCC requests comment on the issue of commercial services meeting the needs of public safety communications. The State of Minnesota would like to address the use of commercial services. The commercial systems used by the State are only for specialized applications. The issues of cost, reliability, response time, and inter-operability are all factors when determining the feasibility of using commercial services for public safety applications. The main drawback to commercial systems is the lack of control of coverage area, service response time, and system expansion. Additional operational problems are encountered when commercial systems are interfaced with our private network. Resolving technical problems can become a long and tedious process. Identifying the appropriate contact

people with technical knowledge of their system or those assigned responsibility for their systems is often difficult. This adds delay to solving system problems and often causes outages that are unacceptable for public safety responders. The types of commercial services we use are listed below with typical examples of their applications and our experiences with these systems.

Some of the services that the state currently uses include: Cellular, Paging, and SMR systems. These services serve a variety of needs that supplement our current system such as: Administrative use, Secondary communications and SCADA. There are a variety of drawbacks to the use of commercial services. For these reasons the use of commercial services has been limited to specific applications or non-critical systems. The typical drawbacks include:

1) Limited coverage area.
2) Service drops out intermittently.
3) No priority service for Public Safety agencies.
4) Difficulty accessing system when outside primary provider service area.
5) No special public safety features or modifications.
6) Higher cost for roaming access.
7) No input on expansion of coverage.
8) Recurring costs / per unit fees. (High recurring costs for statewide (LATA boundaries).
9) Multiple providers for wide area use.
10) Poor response to service outages to remote sites.
11) Provider has limited technical expertise in outstate areas.
12) Inability to provide service to some remote sites.
13) Finger pointing when problems arise on interconnected systems.

The items listed above give a brief overview of the concerns related to the use of commercial providers for Public Safety communications. These can be broken into four key areas. These areas of concern are reliability, responsiveness, coverage, and inter-operability.

Response time to identified problems is not the only concern when dealing with private service providers. System reliability is another key issue to consider when determining which applications are appropriate for use of commercial providers. Remote sites often receive low priority when storms or severe weather interrupt service. Similarly, SMR's and cellular service providers do not give priority to service needs of Public Safety providers. The service response depends on the internal priorities of the service provider. This lack of control regarding service response and priorities is a major concern when considering the use of commercial services.

Coverage concerns also inhibit the State from relying on commercial providers. We provide service on a statewide basis. Many commercial providers such as SMR's and cellular networks focus primarily on population centers. Lack of statewide coverage inhibits the use of these systems for critical public safety communications. Statewide agencies require statewide coverage.

Interoperability is also limited with commercial providers. The ability to scan, monitor, and communicate directly with other law enforcement agencies is a required feature of law enforcement communications systems. Use of cellular or SMR systems does not allow these types of operations.

Because of the limitations of commercial providers in the areas of response, reliability, coverage, and inter-operability, the State has limited use of commercial systems only to specialized applications. No wide-area, statewide applications have been implemented using commercial services. The negative impact commercial providers would have on public safety systems and services are of major concern when determining which applications are appropriate for commercialization.

The State is responsible for assuring the safety of its citizens. The integrity of the statewide communications network is an indispensable tool used by a number of agencies in assuring that safety. Disaster preparedness and coordination is literally non-existent commercial systems. There are specific instances when use of commercial systems are valuable. However, these applications are specialized to a particular application, and localized to specific geographic areas. Overall, the State of Minnesota does not recommend commercial services for critical public safety use, or for any large area systems requirements.

2. Improving Public Safety Spectrum Administration

The current Public Safety Radio Services (PSRS) includes: Police, Fire, Highway Maintenance, Forestry-Conservation, Local Government and Emergency Medical Radio Services. Frequency coordination for these radio services are processed by six different entities. The entities serving Police and Local Governments are Associated Public-Safety Communications Officers (APCO), Fire by International Association of Fire Chiefs/International Municipal Signal Association (IAFC/IMSA), Highway Maintenance by American Association of State Highway and Transportation Officials (AASHTO), Forestry-Conservation by Forestry Conservation Communications Association (FCCA), and Emergency Medical Services by National Association of Business and Educational Radio (NABER) along with IMSA/IAFC.

The spectrum allocation of interest for these services are in the low and highband VHF, UHF and the 800 MHZ channels. The VHF channels are allocated by specific Radio Services. The UHF channels are allocated for all Public Safety Radio Services requiring concurrence from all frequency coordinating entities. The 800 MHZ channels are frequency coordinated by APCO.

Frequency coordination for the low and highband VHF within an applicant's Radio Service is completed by the service's frequency coordinating entity without the requirement of

concurrence by any other frequency coordinating entities. When the applicant Radio Service's channel allocation is not available because of congestion, the applicant's frequency coordinator can interservice share into another Radio Service. This interservice sharing requires one entity requesting concurrence from another entity. This concurrence process involves, multiple frequency coordinators analysis, multiple entity database searches, fee costs between entities, and time requirements. Frequency coordination for the UHF channels are completed by the applicant's Radio Service coordinator. The Radio Service frequency coordinator is then required to obtain concurrence from the four other frequency coordinating entities. This concurrence process involves, multiple frequency coordinator analysis, multiple entity databases searches, and most of all time requirements. Frequency coordination for the 800 MHZ channels are completed by APCO, depending on specific channels the National Public Safety Planning Advisory Committee (NPSPAC) will require pre-coordination before applications are accepted by APCO.

In comparison of the VHF, UHF, and 800 MHZ coordination processes, the 800 MHZ procedure is the most efficient. The 800 MHZ coordination process involves only a single frequency coordinator's analysis, the use of a single frequency database, and takes the least amount of time. A single frequency coordinator's analysis is all that's needed provided a single recognized frequency database is used. Time requirements are also minimized by keeping the process within one frequency coordinating entity, thereby cutting down on duplication of administrative and analysis work.

It is important to note that it is not the separate Radio Services that creates duplication; it is the multiple frequency coordination entities that does. Each Radio Services does have its own specific needs such as repeater frequency pairs, mobile to mobile frequencies, and historical number of channels required. The separate Radio Services do provide a voice to the FCC as to their needs, requirements and concerns. For future considerations, the FCC should consider a single frequency coordination entity to service all Public Safety Radio Service Groups.

Currently most Public Safety Radio Services frequency coordination entities have frequency coordinators assigned by state or region. If a single frequency coordination entity does do all coordinations, the number of coordinators per state or region for that entity should be increased. These coordinators should be assigned by metropolitan and rural areas, not splitting up metropolitan areas due to familiarity of systems and area.

The proposal to require frequency coordination post-license grant for public safety is questionable. The frequency coordinator's job includes the following: check FCC applications for proper content (syntax, eligibility, abide by rules and regulations), coordinate with co-channel and adjacent channel users within the relative area, provide decision for concurrence, enter applications into database, and forward application with recommendation to FCC. The proposal to frequency coordinate post-license grant would mean the FCC would have to check all applications for proper contents, and all applications would go through the FCC licensing processes such as verification of FAA requirements and possible concurrences by different countries. The time line required with frequency coordinating pre or post license would still be about the same, because the process is still being done, but in a different cascading order. If time line is an issue with the applicant, rules regarding conditional temporary authority, and special temporary authority may be applicable for VHF and UHF channels. The FCC should consider the 800 MHZ channels for conditional temporary authority and special temporary authority.

To streamline the process, a single frequency coordination entity should be considered for all Public Safety Radio Services. This single frequency coordinating entity should use one database, accessible by all coordinators. Applications that are in bordering states or frequency coordinator's regions can use the common database.

F. Competition in the Supply of Goods and Services

The FCC's position of creating a environment that fosters competition is commendable, and any initial equipment purchase not limiting choice in upgrade and expansion is of considerable importance to the State's implementation of a region-wide trunking system.

The design of the region-wide trunking system will provide regional coverage in nine counties of a Metropolitan area. The possibility of expansion of the system for counties in the Metropolitan area, rural counties, and statewide does exist. This expansion can include: modifying existing subsystems, add more subsystems, and addition of systems linked together by an interface. The State's concern is that at each of these interfaces, there will be multiple vendor competition, this does imply that these interfaces will have to be defined and available to the vendors.

The subscriber equipment requirements are projected to be over 11,000 radios after five years, and over 20,000 in ten years. The ability to have multiple vendor competition is needed. Again this does imply that the subscriber-to-infrastructure interface will have to be defined and available to the vendors.

An additional issue is that if different Public Safety agencies build systems and subsystem using the same interfaces, then all these systems and subsystems can be interlinked, thereby providing extremely flexible interoperability.

G. NON-ACCREDITED STANDARD-SETTING ORGANIZATIONS FOR PUBLIC SAFETY WIRELESS COMMUNICATIONS EQUIPMENT

In the discussions of the Public Safety Wireless Advisory Committee (Advisory Committee) interoperability subcommittee, a need was identified to develop a baseline technology to promote interoperability between and among public safety entities.

The subcommittee subsequently recommended a baseline technology for analog applications. It was further recommended that a group comprised of experts from government, industry and users be organized following the termination of the Committee's work to examine a baseline interoperability technology that could be used in digital systems.

We believe that the general principles articulated in Section 273 (d) (4) of the Communications Act of 1934 are useful in the development of standards initiated in the future for public safety wireless communication equipment.

We believe that the general principles of 273 (d)(4) requiring a fair and open process can be applicable to non-accredited standard setting user oriented organizations such as APCO.

We believe the Commission should adopt these standards and exercise its authority to impose requirements similar to those identified in section 273 (d)(4) in the area of digital standards.

IV. CONCLUSION

We believe in the critical nature of Public Safety communication and are open to any ideas for its improvement.

Specific examples of how the State of Minnesota has worked to conserve spectrum have been described. Most of the methods suggested in the docket have been used in Mn/DOT designs. Despite using these methods, the spectrum shortage problem is still not entirely solved. Because of substantial growth in new technology applications, crime in inner cities, growth in outer-tier suburbs, general population increase and encroachment of other services into Public Safety spectrum blocks, we believe that Public Safety needs more spectrum. The spectrum must be in bands below 1 Ghz which have propagation characteristics that are practical for wide area Public Safety systems.

We believe that the Commission's Rules and Regulations must be modified to encourage a standard for Public Safety digital communication. The standard must allow for new technology and also protect the substantial investment of Public Safety systems.

The Commission must recognize that Public Safety has unique land mobile requirements and act accordingly.

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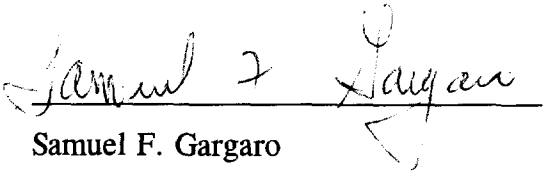

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